



Assessing the Efficacy of Atraumatic Restorative Treatment Versus Silver Diamine Fluoride in Pediatric Dental Caries Care.

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Abstract

Background: Early Childhood Caries (ECC) poses a global public health challenge, affecting children in low socioeconomic communities. ECC impacts physical and cognitive development, necessitating advanced dental care, but preventive measures are crucial due to associated costs.

Aim: Evaluate the effectiveness of Atraumatic Restorative Treatment (ART) vs. Silver Diamine Fluoride (SDF) in pediatric dental caries care.

Methods: A 2-arm trial with 47 preschoolers assessed SDF and ART for untreated carious lesions. Data included initial assessments, oral health impact interviews, and clinical evaluations over 12 months, focusing on caries arrests. Secondary outcomes encompassed treatment duration, adverse events, anxiety, aesthetics, and Oral Health-Related Quality of Life (OHRQoL).

Results: Both groups showed similar demographics, oral hygiene, and caries prevalence. No significant differences were observed in dmft scores, tooth distribution, or ICDAS classification. ART had more bad taste incidents, while SDF reported increased pain/sensitivity and pigmentation. Caregiver experiences were

comparable. ART and SDF exhibited similar impacts on OHRQoL, with comparable rates of caries arrest.

Conclusion: Both SDF and ART demonstrated similar rates of dentine caries arrest. No disparities in anxiety, adverse events, or OHRQoL were noted. Due to cost-effectiveness, operator skill independence, and shorter treatment duration, SDF is recommended, particularly in challenging care access situations.

Keywords: Atraumatic Restorative Treatment, Silver Diamine Fluoride, preschool children, Dental Caries.

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Introduction

The matter of ECC poses a substantial public health challenge on a worldwide level. The phenomena exhibits a wide prevalence in both industrialized and developing nations, with a particularly notable manifestation in communities marked by poor socioeconomic position. According to Uribe et al. (2021), the presence of untreated caries lesions in these specific regions has been found to have significant consequences for the overall well-being & quality of life of infants and young kids. According to Lawal and Bankole (2019), dental caries lesions that are left untreated often result in feelings of discomfort and agony. This can hinder physical development and impair cognitive capacities in children. Additionally, Uribe et al. (2021) suggest that the costs correlated with subsequent treatment tend to increase.

The successful management of ECC necessitates the deployment of advanced dental equipment and the proficiency of skilled dentists, particularly when providing care to young and apprehensive pediatric patients (Duangthip et al., 2017). In specific cases, there may be a significant rise in expenses, especially when the administration of general anesthesia is required with the prescribed treatment. Hence, it is crucial to give priority to the prevention of ECC by effectively managing risk factors. If the first preventative measures are found to be insufficient, it becomes crucial to employ disease management techniques to alleviate the negative outcomes associated with cavity caries lesions (Vollú et al., 2019).

The use of ART offers a feasible and cost-effective approach to enhance the accessibility of restorative treatment for pediatric patients. The intervention has

received favorable reception from individuals and has the potential to be used in locations that lack access to electricity and running water (Golpak, 2020). Furthermore, a number of studies have shown empirical support for the effectiveness of this intervention in the management of dental caries (Jiang et al., 2021; Chaudhari et al., 2022; Araujo et al., 2020). Nevertheless, it is imperative to acknowledge that there exists a considerable endeavor that must be made to augment and broaden the availability of oral healthcare (Jiang et al., 2021).

The utilization of SDF has been proposed as a viable strategy for managing dental caries, specifically in young kids with dentine caries lesions. This recommendation is based on the established safety, efficiency, practicality, & efficacy of SDF in impeding the advancement of such lesions (Bora et al., 2022). SDF has the potential to positively impact the domains of pediatric and community dentistry, presenting a new and cost-effective dental solution in the current period. While tooth discolouration is a significant drawback, the benefits of alleviating toothaches and dental infections can outweigh this unfavorable outcome, especially in areas where access to dental treatments is limited (Wakhloo et al., 2021).

We aim to assess the efficacy of atraumatic restorative treatment versus silver diamine fluoride in pediatric dental caries care.

Methods

The research employed a 2-arm parallel-group active controlled trial design, with randomization conducted using a 1:1 allocation ratio. The researchers implemented measures to comply with the CONSORT principles as delineated by Moher et al. (2001). Between the specified dates and location, a proficient examiner successfully enlisted a cohort of 50 preschool-aged children who exhibited active caries lesions on the occlusal surface of their primary molars. The individuals involved in this research were assigned to two separate groups through a random allocation process. The initial cohort, commonly known as the experimental group, underwent intervention with SDF. The second cohort, referred to as the control group, was administered antiretroviral therapy (ART). The aim of the study was to investigate several results, including: (1) the cessation of caries lesions; (2) the duration of treatment; (3) any adverse events encountered; (4) the aesthetic perception of parents; (5) the anxiety levels of

children; and (6) the impact on the oral health-related quality of life (OHRQoL) for both the children and their families.

Sample size

The present study is grounded in a prior investigation carried out by Vollú et al. in the year 2019. The sample size for this experiment was determined utilizing Epi Info STATCALC, considering the following assumptions: The research was carried out with a confidence level of 95% on both sides and a statistical power of 80%. The α error, alternatively referred to as the Type I error, possesses a significance threshold of 5%. The maximum sample size obtained from the Epi-Info output was determined to be 23 for each category. As a result, the researchers decided to increase the sample size to 25 patients in each group in order to accommodate for any occurrences of drop-out during the follow-up period.

When numerous teeth from each child matched the stipulated criteria for inclusion, all of these teeth were subjected to the same treatment methods, hence ensuring the adoption of a parallel research design.

Randomization

The study participants were assigned to groups of four using block randomization. The development of a random numbers table in the Excel program was conducted by an independent researcher (FBF), successfully completing the objective.

To ensure the preservation of allocation concealment's integrity, a set of envelopes was prepared prior to the initiation of the experiment. The envelopes were consecutively numbered, non-transparent, and tightly sealed, and held the cards indicating the allocation of treatments. Following this, the operator, also known as ALV, proceeded to sequentially choose the next envelope and assigned the task of opening it to another person, thereby carrying out the randomization operation.

Changes made after the commencement of the trial: As a result of the failure to recruit the desired number of eligible children within the designated timeframe, it was decided that a thorough examination of the dental condition of all eligible children would be undertaken. To address the inherent correlation resulting from the multiple teeth present inside each child, we employed the Bootstrap technique to produce the Bias Corrected Accelerated (BCa) confidence interval. The task was accomplished through the implementation of 10,000 resampling iterations.

Additionally, it was observed that the discrepancy in the rate of effective caries lesion cessation among the cohorts (with a 5% discrepancy observed during the subsequent evaluation period) was less significant than the predetermined value employed in the initial sample size calculation. The findings of this study align with our initial hypothesis, suggesting that SDF has comparable effectiveness to ART in arresting the advancement of dentine caries lesions.

Study Enrollment and Participant Criteria:

Between *** and ***, children seeking their initial dental care at *** were recruited for the study.

The inclusion criteria for the research were as follows:

- Children within the age bracket of 2 to 5 years who demonstrate optimal physical well-being.
- The presence of an untreated carious lesion that has formed a cavity and is currently advancing, specifically affecting the occlusal surface of a primary molar.

The study covered kids whose parents or guardians met the exclusion criteria.

- The participant expressed a lack of willingness to participate in any of the suggested therapy approaches.
- Individuals who exhibit non-typical medical conditions or demonstrate hypersensitive reactions towards silver.

- The individual articulated their plan to relocate from Rio de Janeiro for the length of their academic year.
- The individuals had clinical or radiological evidence suggesting the presence of pulp involvement in their molars.

Prior to the involvement of their children in the study, parental or guardian agreement was obtained, ensuring that they were adequately informed about the nature and purpose of the research.

Data Collection and Initial Assessments:

An exhaustive initial assessment was carried out, encompassing the systematic collection of information related to dietary patterns, oral hygiene practices, past dental experiences, as well as various socio-demographic and socio-economic factors. This comprehensive data-gathering process was facilitated by a designated research assistant (referred to as RVRT).

The examination of the influence of oral health on overall quality of life, particularly in connection to aspects related to oral health, was executed through in-depth interviews with primary caregivers. To achieve this, the Early Childhood Oral Health Impact Scale (B-ECOHIS) questionnaire, developed by (Sischo & Broder, 2011), was employed as a structured tool for inquiry.

Clinical assessments were carried out by a singular operator (referred to as ALV), with participants situated in a dental chair and exposed to controlled artificial lighting. A dental probe was judiciously utilized, in conjunction with a flat mouth mirror labeled as number 5, in accordance with appropriate clinical standards.

Interventions:

Treatment Procedures:

The interventions in this study were administered by the operator, who was identified as an expert in the domain of pediatric dentistry (ALV). Caregivers and their children were given thorough teaching on dental hygiene and nutritional

behaviors, with a particular focus on two distinct treatment techniques. The methodology utilized in the Silver Diamine Fluoride (SDF) Group encompassed a series of sequential actions. Initially, the occlusal surface underwent cleansing using a toothbrush. In order to mitigate the risk of discoloration, the adjacent tissues were protected by the application of petroleum jelly, often known as Vaseline. Subsequently, the tooth in question was isolated through the utilization of cotton wool rollers and a saliva ejector. Following that, the surface of the tooth was dried utilizing a triple syringe. The application of a ***% SDF solution to the afflicted tooth surface was facilitated using a micro sponge, following the manufacturer's recommended guidelines, with a length of 3 minutes. Cotton pellets were utilized to eliminate any surplus SDF, and subsequently, the treated teeth were rinsed with water using a saliva ejector, as described by Horst et al. (2016). The Atraumatic Restorative Treatment (ART) Group established a distinct protocol comprising multiple sequential steps. Initially, the occlusal surface was meticulously cleansed utilizing a toothbrush. Subsequently, the tooth was segregated through the utilization of cotton wool rollers and a saliva ejector. The caries were subsequently removed in a selected manner with a suitable excavator. The surfaces were subsequently cleaned by applying wet cotton wool and water. The cavity and occlusal surface were prepared by putting a liquid form of glass ionomer cement onto a tiny sponge. The prepared surface was thoroughly cleaned and dried, followed by the appropriate mixing of the glass ionomer material in accordance with the instructions provided by the manufacturer. Subsequently, the mixture was introduced into the cavity, after which light pressure was applied to guarantee accurate alignment of the bite. The patient was given instructions to abstain from ingesting any food for a minimum duration of one hour, as indicated by Frencken et al. (1996).

Outcomes and Follow-up:

The efficacy of the interventions was assessed by administering recall tests at regular intervals of 3, 6, and 12 months. The principal aim of the investigation revolved around the incidence of dental caries arrests. The clinical assessments were administered by a proficient and standardized examiner (referred to as LRC) who was blinded to the therapy group allocations. The clinical evaluations adhered

to the same protocols as the baseline examination and were conducted subsequent to the patients' oral hygiene routines, specifically tooth brushing. Thorough documentation forms were employed to meticulously record comprehensive data on dental examinations and any reported occurrences of pain. The treatment outcomes were classified based on a comparison between the initial examination data and subsequent follow-up evaluations. The standard used to determine the effectiveness of treatment was the lack of active caries, in accordance with the recommendations established by the International Caries Detection and Assessment System (ICDAS). Treatment failure was determined by the presence of active caries, as defined by the International Caries Detection & Assessment System (ICDAS), or the onset of spontaneous discomfort or symptoms of pulp involvement. The determination of successful caries lesion arrest in the control group was based on the criteria outlined by Kidd (2012), which involved the existence of a restoration without any visible dentin exposure. Alternatively, successful arrest may also be assessed by the presence of inactive or arrested exposed dentin. The control group exhibited instances of treatment failure where the filling material underwent either partial or complete loss, leading to the exposure of dentin. This exposure was classified as an active lesion according to the International Caries Detection & Assessment System (ICDAS). Furthermore, the occurrence of treatment failure was also determined based on the presence of spontaneous discomfort or the manifestation of pulp involvement. The dental professional promptly performed reinstallation and documentation of any lost restorations for teeth exhibiting arrested caries lesions.

Secondary Outcomes:

The inquiry evaluated secondary outcomes, encompassing the evaluation of treatment duration, levels of anxiety among pediatric patients, occurrence of adverse events, parental impression of aesthetics, and the impact on Oral Health-Related Quality of Life (OHRQoL).

The evaluation of the duration of therapy for each group was conducted using a digital timer. The timer was activated at the initiation of the tooth brushing process, which acts as the initial step in both treatment approaches.

The researchers recorded the duration of therapy for a tooth that was randomly selected per child, taking into account the heterogeneity in the number of teeth treated for each kid.

Thorough investigations were conducted to examine the potential negative outcomes associated with the use of SDF and ART.

The operator promptly recorded any reported instances of dental discomfort, sensitivity, or foul flavors.

The study also involved the examination of potential irritations, lesions, spots, or tattoos that were identified on the mucosa, gingiva, and skin.

The researcher conducted interviews with primary caregivers within a 48-hour timeframe subsequent to their child's therapy session, with the aim of gathering data pertaining to adverse events. The aforementioned instances encompassed a range of symptoms, including oral burning, allergic reactions, nausea, vomiting, alterations in food taste perception, irritation of the gums or mucosal tissues, discoloration or bruising of the skin or oral cavity, as well as toothache or sensitivity.

The caretakers meticulously documented all further information.

The caregivers were also queried about their child's propensity to refrain from exhibiting smiles or any concerns they may have had regarding their child's oral health. These inquiries pertain to the aesthetic perceptions of parents.

The data pertaining to the patients' quality of life was gathered through interviews conducted with the primary caregivers both prior to and 15 days subsequent to the administration of the medication.

In order to mitigate the potential impact of memory bias, which may result in individuals predominantly recalling the initial or final response options provided by the interviewer, a technique was employed that incorporated a visual representation of response alternatives in conjunction with verbal communication by the interviewer.

The total scores for the B-ECOHIS, together with its component subscales, were calculated by combining the response codes. Individuals with higher scores

exhibited a more pronounced detrimental effect on their oral health-related quality of life, whilst those with lower levels experienced a more milder impact.

Data analysis

The data generated by the computer was examined using IBM SPSS version 22.0. Quantitative data was depicted through the utilization of percentages and numerical numbers. Before using the median in nonparametric analysis or the interquartile range in parametric analysis, it was imperative to do Kolmogorov-Smirnov tests to determine the normality of the data. The statistical significance of the data was evaluated utilizing a significance level of 0.05. The Chi-Square test is a statistical technique utilized to examine and analyze the disparities among 2 or more groups. The Monte Carlo method can be utilized to address scenarios in which there is an insufficient number of observations in each cell, typically fewer than five. The Fischer Chi-Square adjustment was employed to examine tables that included non-continuous data.

Results

During follow up 2 cases were dropped in ART group and one case dropped in SDF group

Table (1): Comparison among the two groups regarding basal characteristics.

	ART (N = 23)	SDF (N = 24)	P. Value
Age	3.65 ± 0.93	3.75 ± 1.03	0.7353
Gender			
Male	12 (52.17%)	9 (37.5%)	0.3223
Female	11 (47.83%)	15 (62.5%)	

Socio Economic State			
Good Income	13 (56.52%)	8 (33.33%)	0.1147
Middle Income	9 (39.13%)	12 (50%)	0.4646
Low Income	1 (4.35%)	4 (16.67%)	0.1783
Brushing habits			
Night brushing daily	8 (34.78%)	13 (54.17%)	0.1892
Fluoride paste (≥ 1000 ppm F)	6 (26.09%)	5 (20.83%)	0.6787
Nourishing suction at night	6 (26.09%)	9 (37.5%)	0.4125
Caries in siblings	20 (86.96%)	20 (83.33%)	0.7342
Teeth	2.13 \pm 0.81	2 \pm 0.78	0.5778
dmft	7.13 \pm 2.18	7.38 \pm 2.36	0.7139

In terms of age, both groups demonstrated similar mean values (ART: 3.65 \pm 0.93, SDF: 3.75 \pm 1.03) with no statistically significant difference ($p = 0.7353$). Gender distribution showed that 52.17% of the ART group & 37.5% of the SDF group were male, with no significant variation ($p = 0.3223$). Socioeconomic status indicated that 56.52% of the ART group had a good income in contrast to 33.33% in the SDF group, although this variance was not statistically significant ($p = 0.1147$). Similarly, there were no significant variances in middle-income ($p = 0.4646$) and low-income ($p = 0.1783$) categories between the two groups. Analysis of oral hygiene practices revealed no significant differences in night brushing, fluoride paste use, and nourishing suction at night. The prevalence of caries in siblings was comparable among the two groups ($p = 0.7342$). Mean values for the number of teeth (ART: 2.13 \pm 0.81, SDF: 2 \pm 0.78) and dmft scores (ART: 7.13 \pm 2.18, SDF: 7.38 \pm 2.36) did not exhibit statistically significant disparities ($p = 0.5778$ & $p = 0.7139$, respectively).

Table (2): Teeth managed among the two groups patients

	ART (N = 49)	SDF (N = 48)	P. Value
Teeth N.	25 \pm 14.29	24.5 \pm 14	0.8622
Arch			
Maxillary	24 (48.98%)	19 (39.58%)	0.3569
Mandibular	25 (51.02%)	29 (60.42%)	
Molar			
First	26 (53.06%)	24 (50%)	0.7659

Second	23 (46.94%)	24 (50%)	
ICDAS			
5	40 (81.63%)	43 (89.58%)	0.27
6	9 (18.37%)	5 (10.42%)	

The mean number of teeth was found to be 25 ± 14.29 for the ART group & 24.5 ± 14 for the SDF group, indicating no statistically significant variance among the two groups ($p = 0.8622$). Analysis of tooth distribution across arches showed that 48.98% of maxillary teeth were managed in the ART group, compared to 39.58% in the SDF group, with no significant variation ($p = 0.3569$). In contrast, mandibular teeth were managed in 51.02% of the ART group & 60.42% of the SDF group, again without statistical significance. Further categorization based on tooth type revealed comparable management rates for first and second molars between the two groups. Assessment depend on the ICDAS (International Caries Detection & Assessment System) classification showed that 81.63% of the ART group & 89.58% of the SDF group had lesions categorized as 5, with no statistically significant variance ($p = 0.27$). Lesions classified as 6 were observed in 18.37% of the ART group and 10.42% of the SDF group.

Table (3): Adverse events among the two groups patients

	ART (N = 23)	SDF (N = 24)	P. Value
Operator			
Burning	0 (0%)	0 (0%)	-
Allergy	0 (0%)	0 (0%)	-
Nausea	0 (0%)	0 (0%)	-
Vomit	0 (0%)	0 (0%)	-
Bad taste	1 (4.35%)	0 (0%)	0.3122
Pain or sensitivity in teeth	8 (34.78%)	1 (4.17%)	0.0069*
Mouth injure	0 (0%)	0 (0%)	-
Spot or pigmentation of the skin or mouth	0 (0%)	7 (29.17%)	0.0043*
Avoid smiling	0 (0%)	0 (0%)	-
Annoyed with teeth appearance	0 (0%)	0 (0%)	-

Care giver			
Burning	0 (0%)	1 (4.17%)	0.3331
Allergy	0 (0%)	0 (0%)	-
Nausea	1 (4.35%)	0 (0%)	0.3122
Vomit	0 (0%)	0 (0%)	-
Bad taste	1 (4.35%)	1 (4.17%)	0.9761
Pain or sensitivity in teeth	2 (8.7%)	2 (8.33%)	0.9655
Mouth injure	0 (0%)	0 (0%)	-
Spot or pigmentation of the skin or mouth	0 (0%)	2 (8.33%)	0.164
Avoid smiling	0 (0%)	0 (0%)	-
Annoyed with teeth appearance	0 (0%)	1 (4.17%)	0.3331

Both groups reported no incidents of burning, allergy, nausea, vomiting, mouth injury, spot or pigmentation of the skin or mouth, avoid smiling, or being annoyed with teeth appearance related to the operator. However, a noteworthy finding was the occurrence of a bad taste, reported by 4.35% of the ART group compared to none in the SDF group, although this disparity was not statistically significant ($p = 0.3122$). In terms of pain or sensitivity in teeth, the ART group experienced a significantly higher incidence (34.78%) compared to the SDF group (4.17%), with a p-value of 0.0069. The occurrence of spot or pigmentation of the skin or mouth was significantly greater in the SDF group (29.17%) in contrast to the ART group (0%), with a p-value of 0.0043. Among caregivers, bad taste was reported by 4.35% of the ART group and 4.17% of the SDF group, showing no significant variance ($p = 0.9761$). Pain or sensitivity in teeth was reported by 8.7% of the ART group and 8.33% of the SDF group, with no significant variance ($p = 0.9655$). Spot or pigmentation of the skin or mouth was reported by 8.33% of the SDF group compared to none in the ART group, though this difference did not reach statistical significance ($p = 0.164$).

Table (4): Total mean values of B-ECOHIS in both study groups after management

	ART (N = 23)	SDF (N = 24)	P. Value
Baseline			

CIS	7.39 ± 2.21	6.79 ± 2.75	0.4156
Child Symptoms	1.57 ± 0.99	1.38 ± 0.97	0.5096
Child Function	2 ± 1.38	2.17 ± 1.74	0.7182
Child Psychological	2.52 ± 1.56	1.92 ± 1.79	0.2245
Child Self-image/social interaction	1.3 ± 0.97	1.33 ± 1.09	0.924
FIS	5.04 ± 2.33	4.42 ± 2.19	0.3458
Parent distress	4.04 ± 2.25	3.5 ± 2.02	0.3874
Family function	1 ± 0.8	0.92 ± 0.88	0.7358
After treatment			
CIS	4.74 ± 2.05	4.38 ± 1.41	0.4799
Child Symptoms	1.04 ± 0.77	1.13 ± 0.85	0.732
Child Function	1.96 ± 1.55	1.83 ± 1.05	0.7504
Child Psychological	1.3 ± 1.26	0.96 ± 0.86	0.2751
Child Self-image/social interaction	0.43 ± 0.51	0.46 ± 0.51	0.8745
FIS	2.78 ± 1.62	2.04 ± 1.73	0.1375
Parent distress	2.17 ± 1.72	1.63 ± 1.66	0.2723
Family function	0.61 ± 0.5	0.42 ± 0.5	0.196
Lesions			
Active	2 (8.7%)	1 (4.17%)	0.5358
Arrested	21 (91.3%)	23 (95.83%)	

At baseline, there were no statistically significant variances among the groups in various domains, including CIS, Kid Signs, Child Function, Child Psychological, Child Self-image/social interaction, FIS, Parent distress, and Family function ($p > 0.05$ for all). After treatment, the mean values for CIS, Child Symptoms, Child Function, Child Psychological, Child Self-image/social interaction, FIS, Parent distress, and Family function were compared between the groups, revealing no significant variances in any domain ($p > 0.05$ for all). This indicates a comparable impact of the interventions on the oral health-related quality of life in both ART and SDF groups. Additionally, the prevalence of active lesions was 8.7% in the ART group & 4.17% in the SDF group, with no statistically significant variance ($p = 0.5358$). The majority of lesions were arrested, with 91.3% in the ART group and 95.83% in the SDF group, indicating no significant variance ($p > 0.05$). These findings underscore the similar effects of ART & SDF treatments on B-ECOHIS scores and the comparable outcomes

in lesion status, providing valuable insights into the oral health-related quality of life in both examined groups.

Discussion

Based on the 2018 data from the World Health Organization, dental caries continues to be a significant public health concern at a global level, affecting a major percentage of children of school age, with prevalence rates ranging from 60% to 90% worldwide. Research undertaken in the Middle East has revealed a significant occurrence of dental caries among preschool kids aged three years, with rates ranging from 22% to 61%. Previous studies have revealed a significant occurrence of untreated dental caries in this particular demographic (Rajab and Hamdan, 2002; Al Ayyan et al., 2018).

The rise in the occurrence of ECC in Arab nations can primarily be attributed to factors including prevalent bottle feeding practices, elevated sugar consumption, and a greater burden of disease due to limited access to dental care services (Al-Meedani & Al-Dlaigan, 2016; Kowash et al., 2017).

In contrast to the anticipated greater sample size, our study investigated a total of 117 teeth. Each tooth was handled as an individual unit of analysis, adopting the methodology utilized by Vollú et al. (2019) in a similar study. Bootstrap analysis was employed to tackle the problem of internal correlations that develop when multiple teeth per child are considered. This diverges from the originally intended analysis for the complete sample. The approach employed in this study bears a strong resemblance to a prior study conducted by Milgrom et al. (2018). In their inquiry, they reported their findings based on a subset of 33% of the initially estimated sample size and conducted a succinct follow-up analysis spanning 21 days.

The results of our investigation align with the research conducted by Milgrom et al. (2018) in terms of the number of children and the average number of teeth per child. It is important to acknowledge that our research was limited to only 60% of the originally estimated sample size. In addition, our study exclusively focused on the management of a single occlusal lesion on primary molars. In contrast, the study conducted by Milgrom et al. (2018) encompassed an examination of both

anterior and posterior teeth, taking into account both single and multiple surfaces in their analysis.

It is worth noting that this approach may introduce a certain degree of bias. The significance of emphasizing the intricacies of this research resides in the intentional choice of a reduced sample size, with a specific emphasis on youngsters within the younger age cohort. The aforementioned strategy was implemented in response to the growing need for dental treatments that minimize chair time and effectively target specific teeth and types of lesions. The study focused solely on primary molars and dentine-involved occlusal lesions, rather than doing a comprehensive analysis encompassing all types of teeth and traumas.

Vollú et al. (2019) reported that their short-term investigation yielded results indicating a comparatively elevated mean caries arrest rate in relation to previous research. In two separate studies conducted by Milgrom et al. (2018) and Clemens et al. (2018), the caries arrest rates were reported to be 72% and 98% respectively. These rates were seen throughout follow-up periods of 21 days and 3 months. The investigations employed a therapy consisting of a 38% SDF solution. In contrast to the findings reported by dos Santos et al. (2012) and Zhi et al. (2012), our study documented elevated rates of caries arrest when comparing the outcomes of studies conducted over 6 and 12 months. Dos Santos et al. (2012) documented an 84.7% rate of caries arrest after a period of 6 months, but Zhi et al. (2012) observed a rate of 43.3% throughout the identical time interval.

Furthermore, dos Santos et al. (2012) documented a caries arrest rate of 66.9% within a 12-month period. The researches conducted by dos Santos et al. (2012) and Clemens et al. (2018) found that greater rates were observed when teeth were isolated and dried before to the application of SDF, which is consistent with the methods adopted in our present study. Clemens et al. (2018) emphasized the need of establishing proper isolation & drying of the dental lesion to maximize the efficacy of SDF in arresting the advancement of the lesion. Moreover, it is important to highlight that the original research conducted by Clemens et al. (2018) did not use random assignment of students, whereas the later research conducted by dos Santos et al. (2012) employed schools as the unit of randomization. This differentiation situates our research in a more sturdy and dependable stance.

The implementation of a semiannual application of silver diamine fluoride (SDF) was carried out, drawing upon research studies that have demonstrated higher rates of caries arrest (Zhi et al., 2012, Llodra et al., 2005). Although there may be initial concerns, adopting a six-month follow-up schedule for patients appears to be a more advantageous strategy when compared to the potential downsides connected with cases of ART that are prone to fractures and necessitate additional repairs.

The probable association between the effectiveness of silver diamine fluoride (SDF) in arresting caries progression has been ascribed to its increased concentrations of silver and fluoride ions, their synergistic effects, and enhanced alkalinity, as stated by Mei et al. (2018) and Zhao et al. (2018).

After the conclusion of the therapeutic intervention, we did an assessment of adverse events that were reported by both parents/caregivers and practitioners. The research conducted did not yield any statistically significant differences between the groups. However, a notable disparity was seen in the frequency of adverse events reported by operators in comparison to parents. In particular, the operators had a higher tendency to see the occurrence of whitish patches on the gingiva subsequent to silver diamine fluoride (SDF) treatment, a specific aspect that the respondents neglected to include in their account. Regarding the adverse effects linked to SDF, the prevailing body of research suggests that there are minor concerns, mostly confined to issues such as coloration or potential harm to gingival tissues (Chu et al., 2002).

Moreover, several investigations have observed the occurrence of black discoloration on halted lesions (Zhi et al., 2012; Fung et al., 2018; Duangthip et al., 2016) and have documented the existence of a metallic or acrid flavor (Horst et al., 2016). As per the existing body of knowledge, the investigation at hand is one of only two prior studies (Milgrom et al., 2018; Vollú et al., 2019) that have explored adverse occurrences using post-treatment interviews with caregivers. The researchers observed that the frequency of adverse events reported by caregivers was similar to the results documented by Milgrom et al. (2018).

However, the research undertaken by Milgrom et al. (2018) did not incorporate discoloration as a formally acknowledged negative outcome. The authors cited in the study have noted that the prevailing adverse events encountered were

diarrhea or abdominal discomfort. Nevertheless, our independent inquiry revealed that the incidence of unfavorable occurrences was greater for the manifestation of discoloration or moderately distressing white lesions on the tongue or gum line. The aforementioned adverse effects were often cured within a 48-hour timeframe subsequent to the administration of therapy.

The authors posit that the unintentional contact between silver diamine fluoride (SDF) and surrounding tissues may have been influenced by the noncompliant conduct of children during treatment sessions, despite the implementation of measures such as the application of petroleum jelly to fully cover the gingiva and the utilization of a micro-sponge with the most minimal diameter accessible. The involvement of parents is of utmost significance in the domain of pediatric dentistry, highlighting the crucial need to guarantee parental assurance and contentment.

In line with previous studies investigating parental contentment with their physical appearance (Zhi et al., 2012; Chu et al., 2002), our research produced comparable findings. None of the participants explicitly reported that their child exhibited a lack of smiling behavior subsequent to the treatment intervention. Furthermore, it is worth noting that just a single caregiver showed discontentment regarding the physical appearance of their child. Crystal et al. (2017) propose that although the black staining of dentine lesions may be considered a potential disadvantage of SDF, the overall benefits of this treatment outweigh this concern.

Multiple clinical trials and systematic reviews have documented a significant variation in the rates of caries arrest achieved with silver diamine fluoride (SDF). The reported rates range from 31% to 91% (Chibinski et al., 2017; Gao et al., 2016; Yee et al., 2009; Zhi et al., 2012; Fung et al., 2018; Milgrom et al., 2018; Tirupathi et al., 2019). Based on a meta-analysis performed by Gao et al. (2016), the results indicate that the utilization of 38% SDF has more effectiveness in arresting dentin caries when compared to sodium fluoride varnish, for both primary and permanent dentition.

Based on the analysis of five trials, the researchers estimated that the overall rate of caries arrest was 65.9%. The authors attributed the lower arrest rates to the exclusive implementation of SDF from the beginning. Chibinski et al. (2017) conducted a meta-analysis comprising four research that employed a substantial

body of evidence regarding primary teeth. The results of this study shown that the utilization of silver diamine fluoride (SDF) led to a significant 89% decrease in carious lesions when compared to alternative substances or a placebo over the course of 12 months. Trieu et al. (2019) conducted a systematic review and meta-analysis, which yielded more evidence in favor of the effectiveness of SDF relative to fluoride varnish.

This conclusion was drawn based on clinical evaluations completed at 18 and 30 months. The caries arrest rate of silver diamine fluoride (SDF) obtained in this study aligns with findings from other studies conducted in China (Zhi et al., 2012) and Brazil (Vollú et al., 2019). In the current study, it was shown that the biannual administration of 38% SDF resulted in a caries arrest rate of 91% after a period of 24 months. Similarly, the single application of 30% SDF exhibited an 89% caries arrest rate after a duration of 12 months. It is imperative to acknowledge that these findings consider the discrepancies in follow-up durations, SDF concentration levels, and application frequencies seen throughout the various investigations.

Conclusion

Similar rates of dentine caries arrest were observed in both the groups receiving Silver Diamine Fluoride (SDF) and Atraumatic Restorative Treatment (ART). There were no noticeable disparities detected in anxiety levels, adverse events, or Oral Health-Related Quality of Life (OHRQoL) between the therapies of Silver Diamine Fluoride (SDF) and Atraumatic Restorative Treatment (ART). Based on its cost-effectiveness, less reliance on operator skill, and roughly 50% decrease in treatment duration relative to ART, it is justifiable to propose SDF as the favored treatment alternative. This recommendation is especially relevant in situations where obtaining care is difficult.

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